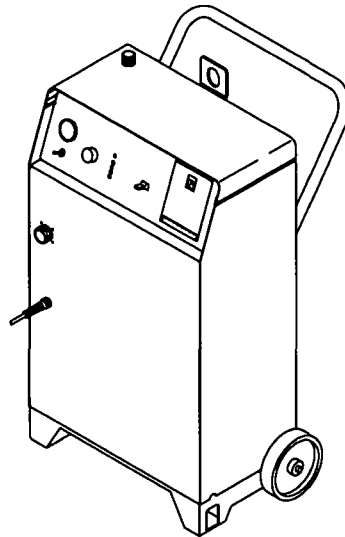


Miller®

February 1997 Form: OM-182 701
Effective With Serial No. KG235604

OWNER'S MANUAL



Spectrum 701

For Plasma Arc Cutting (PAC)

Rated Output	Amperes Input at Rated Load Output 50 Hz, Three-Phase			Plasma Gas	Plasma Gas Flow/ Pressure	Max OCV	IP Rating
	400 V	KVA	KW				
50 A @ 100 Volts DC, 60% Duty Cycle	10.6 (1.7*)	7.2 (0.5*)	6.6 (0.2*)	Air Or Nitrogen Only	7 CGM (170 L/min) At 70 PSI (482 kPa)	265 VDC	23

*While idling

Declaration of Conformity For European Community (CE) Products

Manufacturer's Name: Miller Electric Mfg. Co.

Manufacturer's Address: 1635 W. Spencer Street
Appleton, WI 54914 USA

Declares that the product: **Spectrum® 701**

conforms to the following Directives and Standards:

Directives

Low Voltage Directive: 73/23/EEC

Machinery Directives: 89/392/EEC, 91/368/EEC, 93/C 133/04, 93/68/EEC

Electromagnetic Compatibility Directives: 89/336/EEC, 92/31/EEC

Standards

Arc Welding Equipment, Plasma Cutting Systems: prEN 50192: 1995

Safety Requirements for Arc Welding Equipment part 1: EN 60974-1: 1990

*Arc Welding Equipment Part 1: Welding Power Sources: IEC 974-1
(August 1996 – Draft revision)*

Degrees of Protection provided by Enclosures (IP code): IEC 529: 1989

*Insulation coordination for equipment within low-voltage systems:
Part 1: Principles, requirements and tests: IEC 664-1: 1992*

*Electromagnetic compatibility (EMC) Product standard for arc welding equipment:
EN50199: August 1995*

European Contact: Mr. Luigi Vacchini, Managing Director
MILLER Europe S.P.A.
Via Privata Iseo
20098 San Giuliano
Milanese, Italy

Telephone: 39(02)98290-1
Fax: 39(02)98281-552

SECTION 1 – SAFETY FOR PLASMA ARC CUTTING

OM-182 701 – 2/97

safety_pom1 4/95

1-1. Symbol Usage



Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

▲ Marks a special safety message.

☞ Means NOTE; not safety related.



This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Plasma Arc Cutting Hazards

⚠ WARNING

The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-4. Read and follow all Safety Standards.

Only qualified persons should install, operate, maintain, and repair this unit.

During operation, keep everybody, especially children, away.



CUTTING can cause fire or explosion.

Hot metal and sparks blow out from the cutting arc. The flying sparks and hot metal, hot workpiece, and hot equipment can cause fires and burns. Check and be sure the area is safe before doing any cutting.

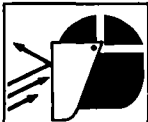
1. Protect yourself and others from flying sparks and hot metal.
2. Do not cut where flying sparks can strike flammable material.
3. Remove all flammables within 35 ft (10.7 m) of the cutting arc. If this is not possible, tightly cover them with approved covers.
4. Be alert that sparks and hot materials from cutting can easily go through small cracks and openings to adjacent areas.
5. Watch for fire, and keep a fire extinguisher nearby.
6. Be aware that cutting on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
7. Do not cut on closed containers such as tanks or drums.
8. Connect work cable to the work as close to the cutting area as practical to prevent cutting current from traveling long, possibly unknown paths and causing electric shock and fire hazards.
9. Never cut containers with potentially flammable materials inside – they must be emptied and properly cleaned first.
10. Do not cut in atmospheres containing explosive dust or vapors.
11. Do not cut pressurized cylinders, pipes, or vessels.
12. Do not cut containers that have held combustibles.
13. Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
14. Do not locate unit on or over combustible surfaces.
15. Remove any combustibles, such as a butane lighter or matches, from your person before doing any cutting.



ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The torch and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. Plasma arc cutting requires higher voltages than welding to start and maintain the arc (200 to 400 volts dc are common), but also uses torches designed with safety interlock systems which turn off the machine when the shield cup is loosened or if tip touches electrode inside the nozzle. Incorrectly installed or improperly grounded equipment is a hazard.

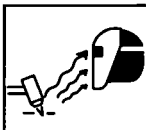
1. Do not touch live electrical parts.
2. Wear dry, hole-free insulating gloves and body protection.
3. Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
4. Do not touch torch parts if in contact with the work or ground.
5. Turn off power before checking, cleaning, or changing torch parts.
6. Disconnect input power before installing or servicing this equipment. Lockout/tagout input power according to OSHA CFR 1910.147 (see Safety Standards).
7. Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
8. Check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet – always verify the supply ground.
9. When making input connections, attach proper grounding conductor first.
10. Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
11. Turn off all equipment when not in use.
12. Inspect and replace any worn or damaged torch cable leads.
13. Do not wrap torch cable around your body.
14. Ground the workpiece to a good electrical (earth) ground if required by codes.
15. Use only well-maintained equipment. Repair or replace damaged parts at once.
16. Wear a safety harness if working above floor level.
17. Keep all panels and covers securely in place.
18. Do not bypass or try to defeat the safety interlock systems.
19. Use only torch(es) specified in Owner's Manual.
20. Keep away from torch tip and pilot arc when trigger is pressed.
21. Clamp work cable with good metal-to-metal contact to workpiece (not piece that will fall away) or worktable as near the cut as practical.



FLYING SPARKS AND HOT METAL can cause injury.

Sparks and hot metal blow out from the cutting arc. Chipping and grinding cause flying metal.

1. Wear approved face shield or safety goggles with side shields.
2. Wear proper body protection to protect skin.
3. Wear flame-resistant ear plugs or ear muffs to prevent sparks from entering ears.



ARC RAYS can burn eyes and skin.

Arc rays from the cutting process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin.

1. Wear face protection (helmet or shield) with correct shade of filter to protect your face and eyes when cutting or watching. ANSI Z49.1 (see Safety Standards) suggests a No. 9 shade (with No. 8 as minimum) for all cutting currents less than 300 amperes. Z49.1 adds that lighter filter shades may be used when the arc is hidden by the workpiece. As this is normally the case with low current cutting, the shades suggested in Table 1 are provided for the operator's convenience.
2. Wear approved safety glasses with side shields.
3. Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
4. Wear protective clothing made from durable, flame-resistant material (wool and leather) and foot protection.



NOISE can damage hearing.

Prolonged noise from some cutting applications can damage hearing if levels exceed limits specified by OSHA (see Safety Standards).

5. Use approved ear plugs or ear muffs if noise level is high.
6. Warn others nearby about noise hazard.

Table 1. Eye Protection For Plasma Arc Cutting

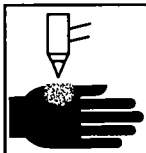
Current Level In Amperes	Minimum Shade Number	
Below 20		#4
20 – 40		#5
40 – 60		#6
60 – 80		#8



FUMES AND GASES can be hazardous to your health.

Cutting produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

1. Keep your head out of the fumes. Do not breathe the fumes.
2. If inside, ventilate the area and/or use exhaust at the arc to remove cutting fumes and gases.
3. If ventilation is poor, use an approved air-supplied respirator.
4. Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instruction for metals to be cut, coatings, and cleaners.
5. Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Fumes from cutting and oxygen depletion can alter air quality causing injury or death. Be sure the breathing air is safe.
6. Do not cut in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
7. Do not cut on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the cutting area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes when cut.
8. Do not cut containers with toxic or reactive materials inside or containers that have held toxic or reactive materials – they must be emptied and properly cleaned first.



PLASMA ARC can cause injury.

The heat from the plasma arc can cause serious burns. The force of the arc adds greatly to the burn hazard. The intensely hot and powerful arc can quickly cut through gloves and tissue.

1. Keep away from the torch tip.
2. Do not grip material near the cutting path.
3. The pilot arc can cause burns – keep away from torch tip when trigger is pressed.
4. Wear proper flame-retardant clothing covering all exposed body areas.
5. Point torch away from your body and toward work when pressing the torch trigger – pilot arc comes on immediately.
6. Turn off power source and disconnect input power before disassembling torch or changing torch parts.
7. Use only torch(es) specified in the Owner's Manual.



CYLINDERS can explode if damaged.

Gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of metalworking processes, be sure to treat them carefully.

1. Protect compressed gas cylinders from excessive heat, mechanical shocks, slag, open flame, sparks, and arcs.
2. Install and secure cylinders in an upright position by chaining them to a stationary support or equipment cylinder rack to prevent falling or tipping.
3. Keep cylinders away from any cutting or other electrical circuits.
4. Never allow electrical contact between a plasma arc torch and a cylinder.
5. Never cut on a pressurized cylinder – explosion will result.
6. Use only correct gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
7. Turn face away from valve outlet when opening cylinder valve.
8. Keep protective cap in place over valve except when cylinder is in use or connected for use.
9. Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

1-3. Additional Installation, Operation, And Maintenance Hazards



HOT PARTS can cause severe burns.

1. Do not touch hot parts bare handed.
2. Allow cooling period before working on torch.





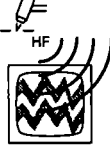

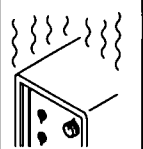

FLYING PIECES OF METAL or DIRT can injure eyes.

1. Wear safety glasses with side shields or face shield.



FALLING EQUIPMENT can cause serious personal injury and equipment damage.

1. Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
2. Use equipment of adequate capacity to lift unit.
3. If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.

	<p>FIRE OR EXPLOSION can result from placing unit on, over, or near combustible surfaces.</p> <ol style="list-style-type: none"> 1. Do not locate unit on, over, or near combustible surfaces. 2. Do not install unit near flammables. 		<p>HIGH-FREQUENCY RADIATION can interfere with radio navigation, safety services, computers, and communications equipment.</p> <ol style="list-style-type: none"> 1. Have only qualified persons familiar with electronic equipment perform this installation. 2. The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation. 3. If notified by the FCC about interference, stop using the equipment at once. 4. Have the installation regularly checked and maintained. 5. Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.
	<p>MOVING PARTS can cause injury.</p> <ol style="list-style-type: none"> 1. Keep away from moving parts such as fans. 2. Keep all doors, panels, covers, and guards closed and securely in place. 		
	<p>STATIC ELECTRICITY can damage parts on circuit boards.</p> <ol style="list-style-type: none"> 1. Put on grounded wrist strap BEFORE handling boards or parts. 2. Use proper static-proof bags and boxes to store, move, or ship PC boards. 		<p>MAGNETIC FIELDS FROM HIGH CURRENTS can affect pacemaker operation.</p> <ol style="list-style-type: none"> 1. Pacemaker wearers keep away. 2. Wearers should consult their doctor before going near plasma arc cutting operations.
	<p>OVERUSE can cause OVERHEATED EQUIPMENT.</p> <ol style="list-style-type: none"> 1. Allow cooling period. 2. Reduce amperage (thickness) or reduce duty cycle before starting to cut again. 3. Follow rated duty cycle. 		<p>SIGNIFICANT DC VOLTAGE exists after removal of input power on inverters.</p> <ol style="list-style-type: none"> 1. Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Maintenance Section before touching any parts.

1-4. Principal Safety Standards

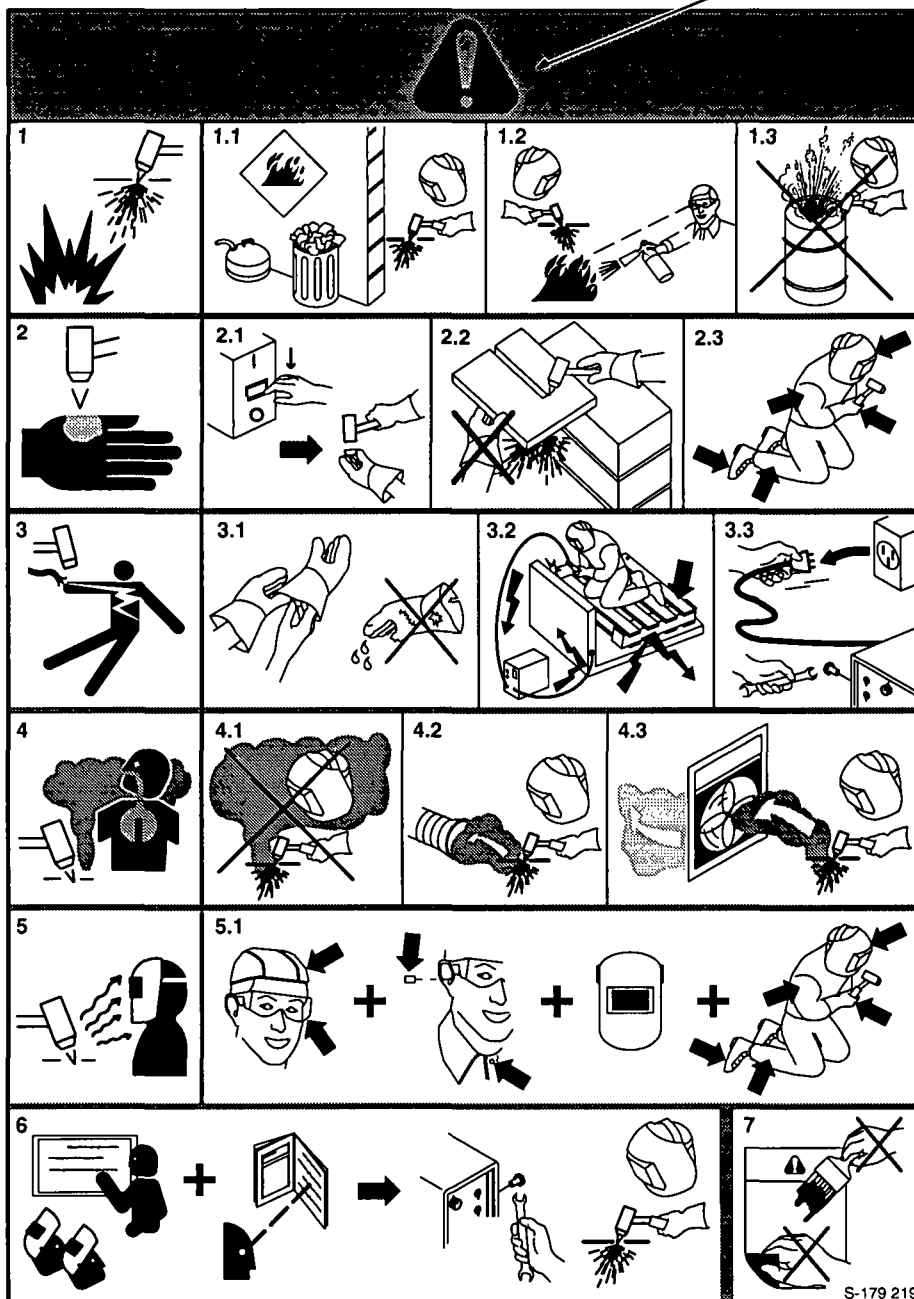
<p><i>Safety in Welding and Cutting</i>, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami FL 33126</p> <p><i>Safety and Health Standards</i>, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.</p> <p><i>Recommended Practices for Plasma Arc Cutting</i>, American Welding Society Standard AWS C5.2, from American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126</p> <p><i>Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances</i>, American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126</p> <p><i>National Electrical Code</i>, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.</p>	<p><i>Safe Handling of Compressed Gases in Cylinders</i>, CGA Pamphlet P-1, from Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.</p> <p><i>Code for Safety in Welding and Cutting</i>, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.</p> <p><i>Safe Practices For Occupation And Educational Eye And Face Protection</i>, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.</p> <p><i>Cutting And Welding Processes</i>, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.</p>
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1-5. EMF Information

<p>Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields</p> <p>The following is a quotation from the General Conclusions Section of the U.S. Congress, Office of Technology Assessment, <i>Biological Effects of Power Frequency Electric & Magnetic Fields – Background Paper</i>, OTA-BP-E-53 (Washington, DC: U.S. Government Printing Office, May 1989): "... there is now a very large volume of scientific findings based on experiments at the cellular level and from studies with animals and people which clearly establish that low frequency magnetic fields can interact with, and produce changes in, biological systems. While most of this work is of very high quality, the results are complex. Current scientific understanding does not yet allow us to interpret the evidence in a single coherent framework. Even more frustrating, it does not yet allow us to draw definite conclusions about questions of possible risk or to offer clear science-based advice on strategies to minimize or avoid potential risks."</p>	<p>To reduce magnetic fields in the workplace, use the following procedures:</p> <ol style="list-style-type: none"> 1. Keep cables close together by twisting or taping them. 2. Arrange cables to one side and away from the operator. 3. Do not coil or drape cables around the body. 4. Keep welding power source and cables as far away as practical. 5. Connect work clamp to workpiece as close to the weld as possible. <p>About Pacemakers:</p> <p>The above procedures are also recommended for pacemaker wearers. Consult your doctor for complete information.</p>
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SECTION 2 – DEFINITIONS

2-1. Warning Label Definitions



Warning! Watch Out! There are possible hazards as shown by the symbols.

- 1 Cutting sparks can cause explosion or fire.
 - 1.1 Keep flammables away from cutting. Do not cut near flammables.
 - 1.2 Cutting sparks can cause fires. Have a fire extinguisher nearby, and have a watchperson ready to use it.
 - 1.3 Do not cut on drums or any closed containers.
- 2 The plasma arc can cause injury and burns.
 - 2.1 Turn off power before disassembling torch.
 - 2.2 Do not grip material near cutting path.
 - 2.3 Wear complete body protection.
- 3 Electric shock from torch or wiring can kill.
 - 3.1 Wear dry insulating gloves. Do not wear wet or damaged gloves.
 - 3.2 Protect yourself from electric shock by insulating yourself from work and ground.
 - 3.3 Disconnect input plug or power before working on machine.
- 4 Breathing cutting fumes can be hazardous to your health.
 - 4.1 Keep your head out of the fumes.
 - 4.2 Use forced ventilation or local exhaust to remove the fumes.
 - 4.3 Use ventilating fan to remove fumes.
- 5 Arc rays can burn eyes and injure skin.
 - 5.1 Wear hat and safety glasses. Use ear protection and button shirt collar. Use welding helmet with correct shade of filter. Wear complete body protection.
- 6 Become trained and read the instructions before working on the machine or cutting.
- 7 Do not remove or paint over (cover) the label.

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Warning! Watch Out! There are possible hazards as shown by the symbols.

Electric shock from wiring can kill.






Disconnect input plug or power before working on machine.

Read the Owner's Manual before working on this machine.

- 1 Consult rating label for input power requirements, and check power available at the job site – they must match.
- 2 Read Owner's Manual and inside labels for connection points and procedures.
- 3 Move jumper links as shown on inside label to match voltage at job site.
- 4 Having a loop of extra length, connect grounding conductor first.
- 5 Connect line input conductors as shown on inside label – double-check all connections, jumper link positions, and input voltage before applying power.


















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2-2. Manufacturer's Rating Label For CE Products

		EN 60974-1			prEN 50192	
		32A/93V		50A/100V		
		X	100%	60%		
	U ₀ = 265V	I ₂	35A	50A		
		U ₂	94V	100V		
 3~ 50 Hz		U ₁ = 400V	I _{1max} =10.6A	I _{1eff} =8.3A		
IP 23						

S-183 506

2-3. Symbols And Definitions

A	Amperes		Plasma Arc Cutting (PAC)		Adjust Air/Gas Pressure		Air Pressure
V	Volts		Increase		No – Do Not Do This		Temperature
	Protective Earth (Ground)		Three Phase		Constant Current		Voltage Input
I	On		Off	%	Percent		Direct Current
U₀	Rated No Load Voltage (Average)	U₁	Primary Voltage	U₂	Conventional Load Voltage		Line Connection
	Expanded Metal	I₂	Rated Welding Current	X	Duty Cycle		Three Phase Transformer Rectifier
IP	Degree Of Protection		Loose Shield Cup	Hz	Hertz	I_{1max}	Rated Maximum Supply Current
I_{1eff}	Maximum Effective Supply Current		Pilot Arc				

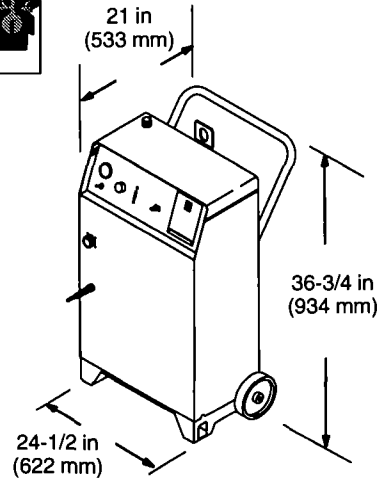
SECTION 3 – INSTALLATION

3-1. Selecting A Location

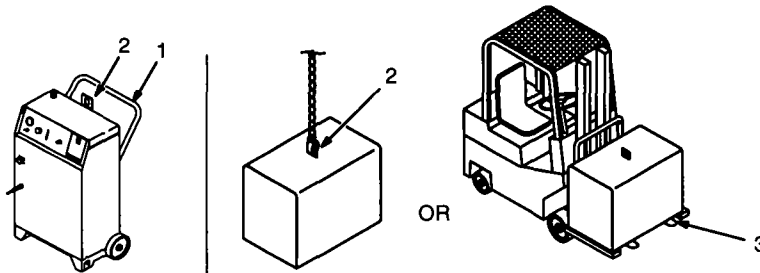


Dimensions And Weight

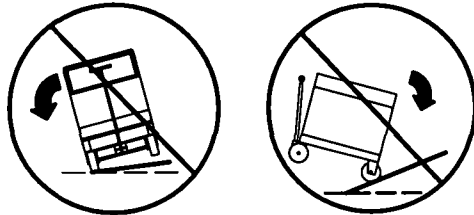
168 lb (76 kg) Without Torch



Movement



▲ Do not move or operate unit where it could tip.



1 Handle

Use handle to roll unit short distances.

2 Lifting Eye

3 Lifting Forks

Use lifting eye or lifting forks to move unit.

If using lifting forks, extend forks beyond opposite side of unit.

4 Rating Label (Under Access Door)

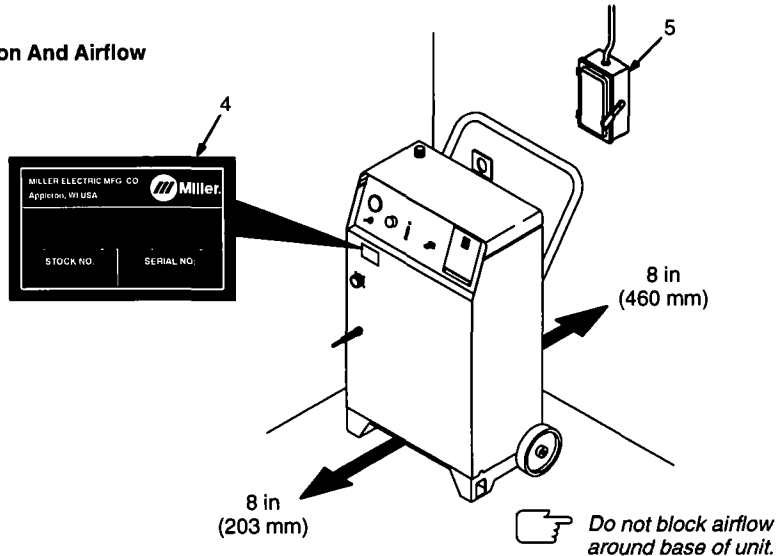
Use rating label to determine input power needs.

5 Line Disconnect Device

Locate unit near correct input power supply.


▲ Special installation may be required where gasoline or volatile liquids are present – see NEC Article 511 or CEC Section 20.

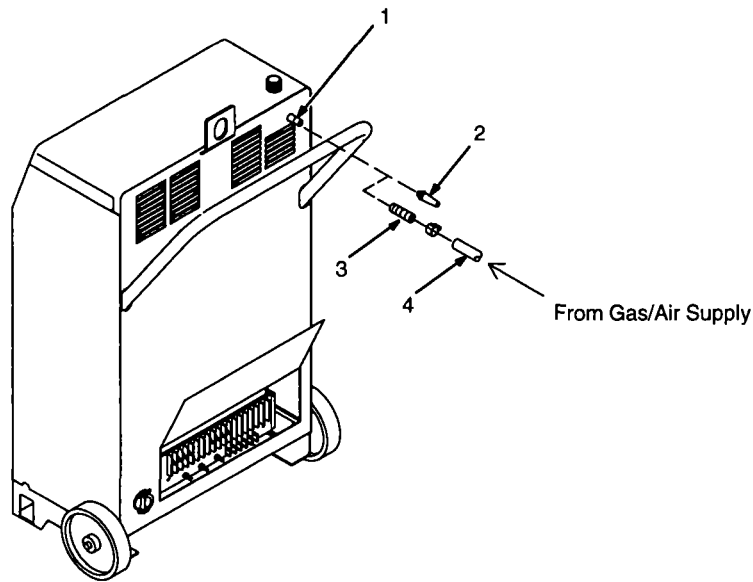
Location And Airflow



Ref. ST-801 454-A / ST-800 402 / Ref. ST-801 454-A

3-2. Connecting Gas/Air Supply

 Use only clean and dry gas/air with 70 to 150 psi (483 to 1034 kPa) pressure.



- 1 Unit Gas Fitting (Female 1/4 NPT)
- 2 Quick Connect Gas Fitting
- 3 Standard Gas Fitting
- 4 Hose

Obtain and install desired fitting.

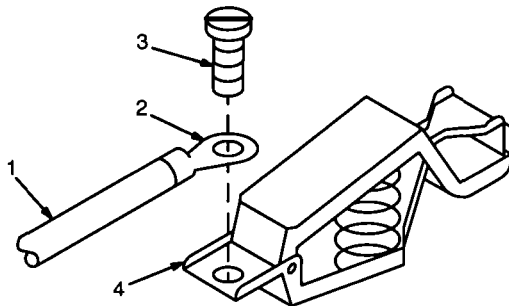
Obtain suitable hose according to installed fitting, and connect to fitting. Route hose to gas/air supply.

Adjust gas/air pressure according to Section 4-2.

▲ Incorrect plasma gas can cause torch and power source damage. Use only air or nitrogen for the plasma gas.

Ref. ST-801 455

3-3. Installing And Connecting Work Clamp



Tools Needed:



- 1 Work Cable From Unit
- 2 Ring Terminal
- 3 Screw
- 4 Work Clamp Handle

Connect ring terminal end of cable to handle using screw.

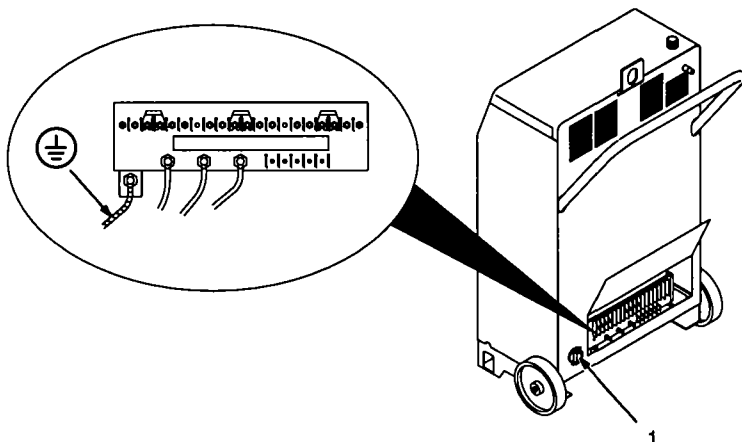
Connect work clamp to a clean, paint-free location on workpiece, as close to cutting area as possible.

ST-800 958

3-4. Electrical Service Guide

Input Voltage	400
Input Amperes At Rated Output	10.6
Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes	15
Min Input Conductor Size In AWG/Kcmil	14
Max Recommended Input Conductor Length In Feet (Meters)	201 (61)
Min Grounding Conductor Size In AWG/Kcmil	14
Reference: 1993 National Electrical Code (NEC)	
S-0092-J	

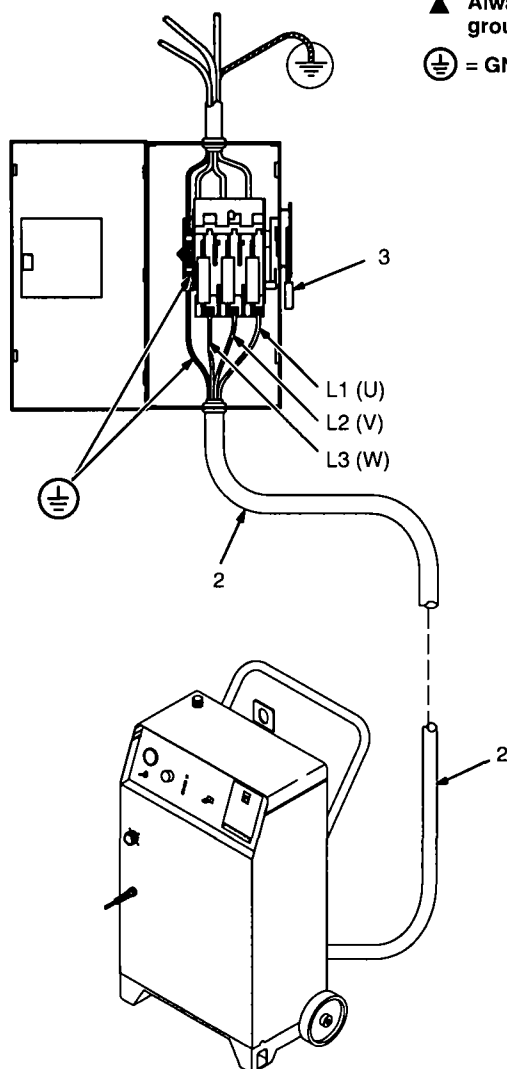
3-5. Connecting Input Power



- 1 Strain Relief Clamp
Route input and grounding conductors through clamp to terminal board.
- 2 Input And Grounding Conductors
- 3 Line Disconnect Device
Select type and size of overcurrent protection using Section 3-4.

▲ Always connect grounding conductor first.

⊕ = GND/PE



Tools Needed:

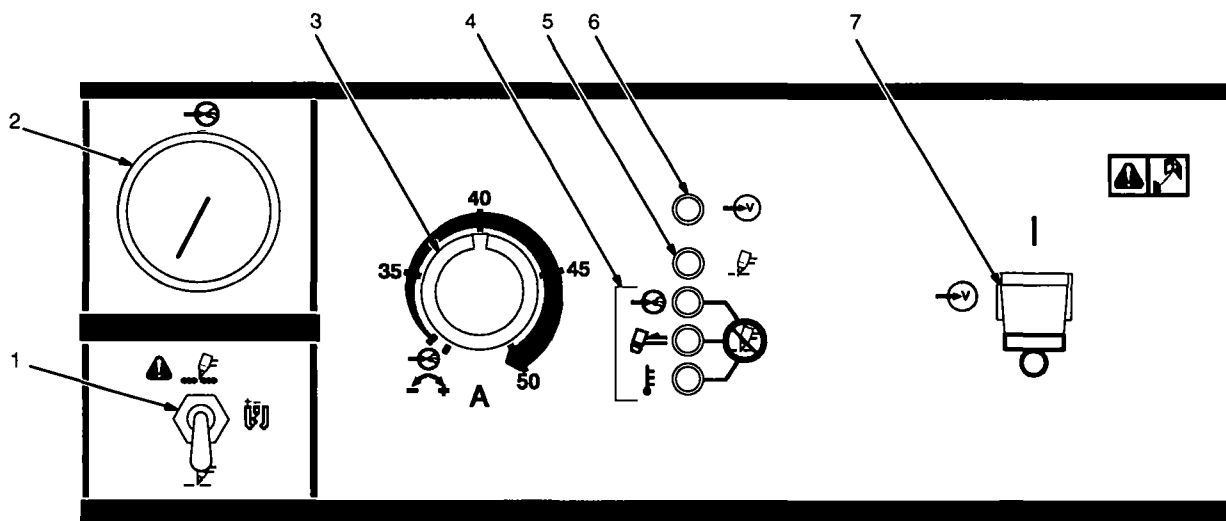


7/16 in

1/2 in

SECTION 4 – OPERATION

4-1. Front Panel Controls




Ref. ST-183 505

1 Pilot Arc Switch

Use switch to control pilot arc.

Place switch in Expanded Metal position for continuous pilot arc. Use while cutting expanded metals **only**.

 *The Expanded Metal position keeps the pilot arc in the circuit at all times. Life of consumables will be significantly reduced while in Expanded Metal mode.*

Place switch in Tip Saver position to provide pilot arc output for arc starting only. Use Tip

Saver position in most applications to lengthen the life of the torch and its consumables, and to obtain maximum cutting performance.

Torch trigger must be reset after every cut while in Tip Saver mode.

2 Gas/Air Pressure Gauge

3 Output Control

Use control to select cutting output in amperes. Gas/air automatically flows at the set pressure.

Use Gas/Air Set area of control range for setting gas/air pressure (see Section 4-2).

4 Trouble Lights (see Section 5-3)


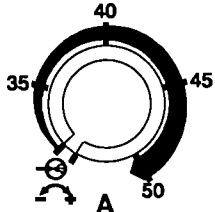
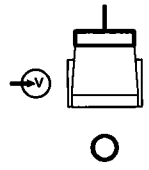
5 Ready Light

Ready light comes On when unit is On to indicate that all safety shutdown systems are okay. If Ready light does not come On, check trouble lights.

6 Power Light

7 Power Switch


4-2. Setting Gas/Air Pressure

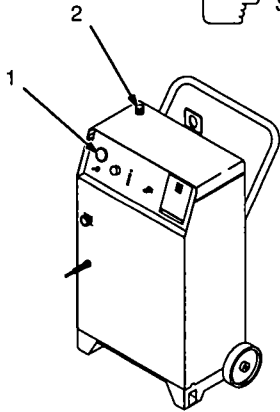




Place controls in positions shown to adjust air pressure. Only gas/air circuit is activated when the Power switch is turned On with Output Control in Gas/Air Set position.

- 1 Pressure Gauge
- 2 Pressure Adjustment Knob

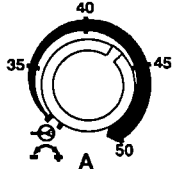
Lift knob and turn to adjust pressure. Push knob down to lock in setting. Place output control in desired cutting output.

 Set pressure to 70 PSI (483 kPa).




Requires 70–150 PSI (483–1034 kPa) Supply

Set Controls → Turn On Gas/Air Supply → Adjust Pressure → Select Desired Amperage To Begin Cutting



Ref. ST-801 454-A

4-3. Duty Cycle And Overheating

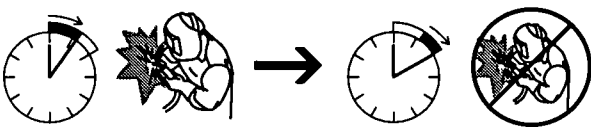


Duty Cycle is percentage of 10 minutes that unit can cut at rated load without overheating.

If unit overheats, thermostat(s) opens, output stops, and cooling fan runs. Wait fifteen minutes for unit to cool. Reduce amperage or duty cycle before cutting.

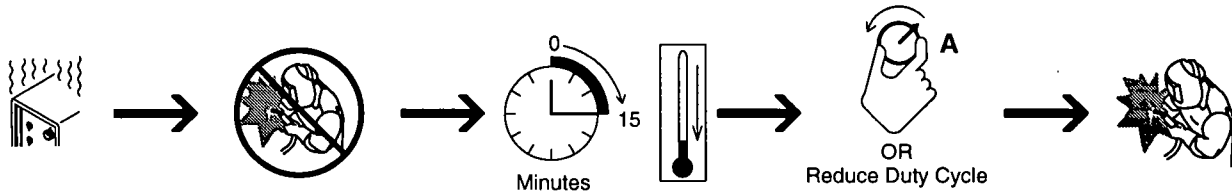
▲ Exceeding duty cycle can damage unit and void warranty.

60% Duty Cycle



6 Minutes Cutting → 4 Minutes Resting

Overheating



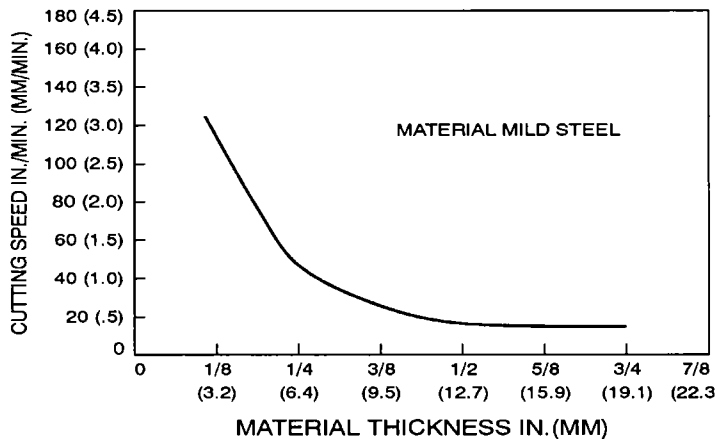
Minutes

OR Reduce Duty Cycle

duty1 4/95

4-4. Cutting Speed

RECOMMENDED PRODUCTION CUTTING
SPEED vs. MATERIAL THICKNESS



The cutting speed curve shows the recommended maximum cutting speed capabilities of the power source and torch for mild steel of various thickness.

▲ Exceeding recommended cutting speeds will cause rapid erosion of the tip and electrode.

✎ Cutting speed is approximately 10 inches per minute at 0.7 in mild steel thickness at max setting in tip saver mode.

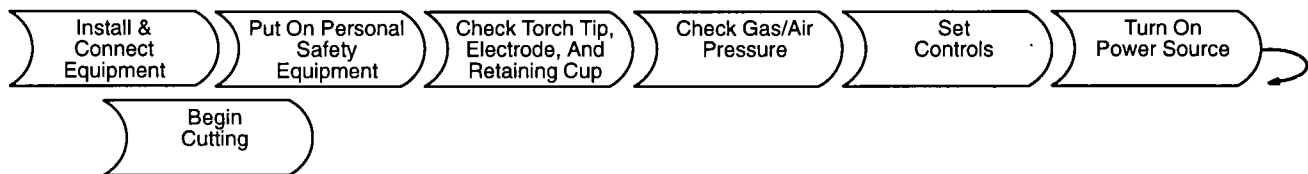
ST-180 909

4-5. Sequence Of Operation



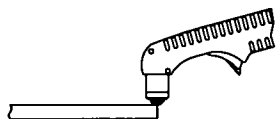
⚠ Do not clean torch by hitting it against a hard surface. Hitting hard surfaces can damage torch parts and stop proper operation.

⚠ Inspect shield cup, tip, and electrode for wear before cutting or whenever cutting speed has been significantly reduced (see torch Owner's Manual). Do not operate torch without a tip or electrode in place.

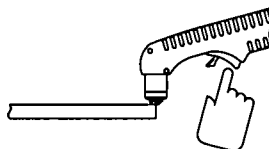


EXAMPLE Of Cutting Operation

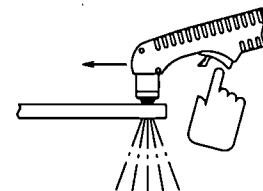
⚠ The pilot arc starts immediately when trigger is pressed.



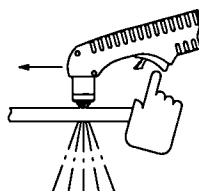
Place drag shield on edge of metal, or allow correct standoff distance – approximately 1/8 in (3 mm).



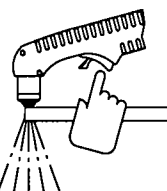
Press trigger. Pilot arc starts.



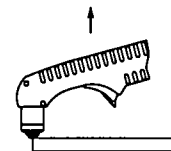
After cutting arc starts, slowly start moving torch across metal.



Adjust torch speed so sparks go thru metal and out bottom of cut.



Pause briefly at end of cut before releasing trigger.





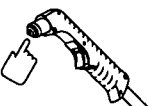
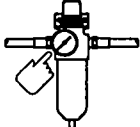





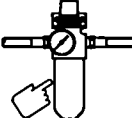

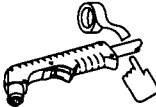
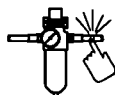




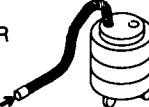


Postflow continues for approx. 20 to 30 seconds after releasing trigger; cutting arc can be instantly restarted during postflow by pressing trigger.

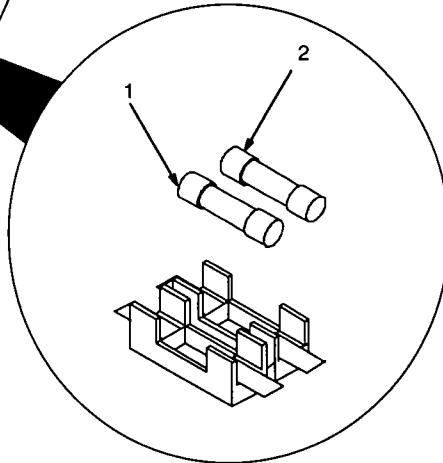
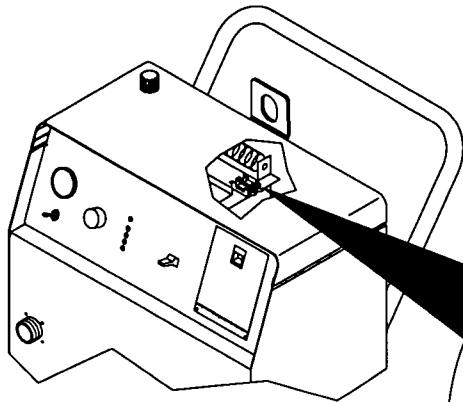
ST-801 400-A

SECTION 5 – MAINTENANCE & TROUBLESHOOTING

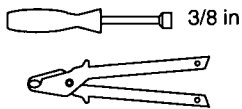
5-1. Routine Maintenance

							Disconnect power before maintaining.	 <i>Maintain more often during severe conditions.</i>					
 Each Use													
			Check Torch Tip, Electrode, And Shield Cup						Check Gas/Air Pressure				
 Every Week													
			Check Shield Cup Shutdown System										
 3 Months													
						Replace Unreadable Labels						Service Air Filter/Regulator Assembly Filter	
			Replace Cracked Parts						Tape Torn Outer Covering Or Replace Cable				
Check Gas/Air Hose												Check Torch Body	
 6 Months													
			OR						Blow Out Or Vacuum Inside				

5-2. Overload Protection: Fuses



Tools Needed:



▲ Turn Off unit, and disconnect input power.

Remove top cover.

1 Fuse F1 (See Parts List)

2 Fuse F2 (See Parts List)

F1 and F2 protect the secondary winding of transformer T1 from overload. If F1 or F2 opens, cutting output stops and no pilot arc is available. The trouble lights and fan remain operational.

Replace F1 and/or F2 if open.

Reinstall top cover.

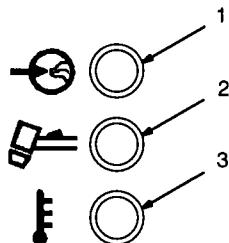
☞ If fuse continues to open, contact Factory Authorized Service Agent.

Ref. ST-801 454-A

5-3. Trouble Lights



Difficulty establishing pilot arc may indicate consumables need to be cleaned or replaced.



1 Pressure Light

Lights if gas/air pressure is below 40 PSI (276 kPa).

Turn power Off, and check for proper gas/air pressure (see Section 4-2).

2 Cup Light

Lights if shield cup is loose.

Turn power Off, and check shield cup connection (see torch Owner's Manual). Power must be reset whenever the cup shutdown is activated.

Check shield cup shutdown system once a week (see Section 5-5).

3 Temperature Light

Lights if power source overheats (see Section 4-3).

5-4. Checking/Replacing Torch Retaining Cup, Tip, And Electrode



Overtightening will strip threads. Do not overtighten electrode, tip, and retaining cup during assembly. Do not cross-thread parts causing stripping. Use care during torch assembly and parts replacement.



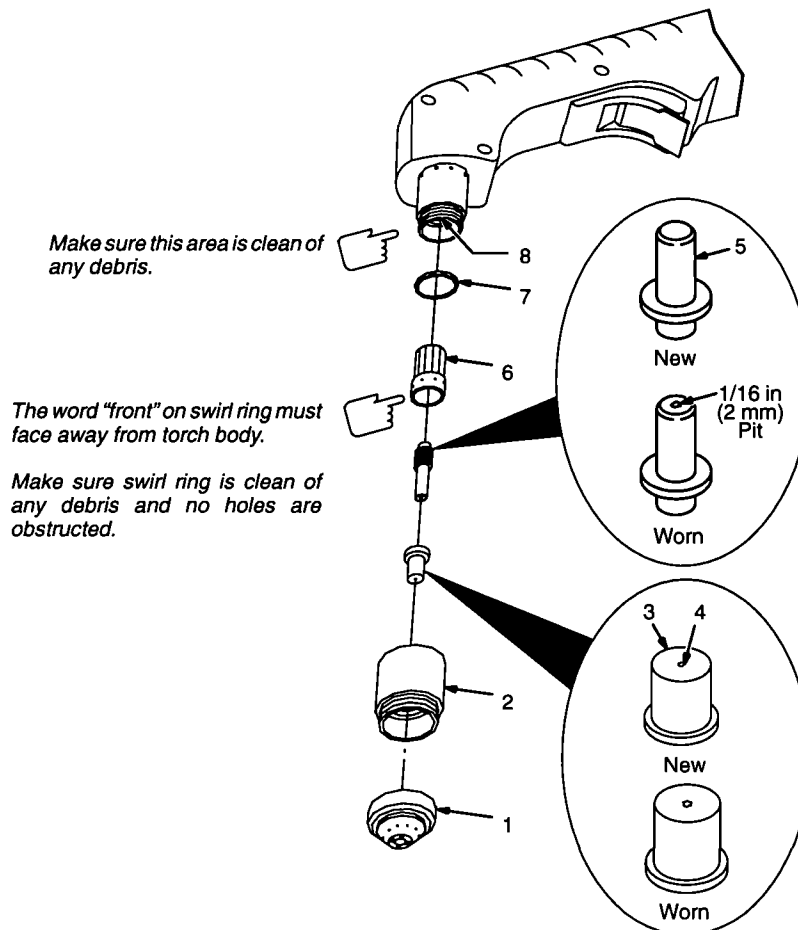
Inspect shield cup, tip, and electrode for wear before cutting or whenever cutting speed has been significantly reduced. Do not operate torch without a tip or electrode in place. Be sure to use genuine replacement parts.



A good practice is to replace both the tip and electrode at the same time.



Turn Off power source before checking torch parts.



ST-801 139 / Ref. ST-801 396-A / ST-801 405

Turn Off power source.

1 Drag Shield

2 Retaining Cup

Remove retaining cup. Check retaining cup for cracks, and replace if necessary.

3 Tip

4 Opening

Remove tip. Check tip, and replace if opening is deformed or 50% oversize. If inside of

tip is not clean and bright, clean with steel wool. Be sure to remove any pieces of steel wool afterwards.

5 Electrode

Check electrode. If center has a pit more than a 1/16 in (2 mm) deep, remove and replace electrode.

6 Swirl Ring

Remove swirl ring. Check ring, and replace if side holes are plugged.

7 O-Ring

Check O-rings on torch. If needed, coat with thin film of supplied lubricant. Replace if damaged.

8 Plunger Area

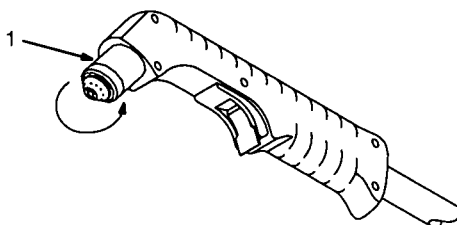
Check this area for any debris or foreign material. Clean out if necessary.

Carefully reassemble parts in reverse order. Swirl ring must be installed with word "front" facing away from torch body.

5-5. Checking Shield Cup Shutdown System



Power must be reset whenever the cup shutdown system is activated. **Always turn Off power when changing or checking consumables.**



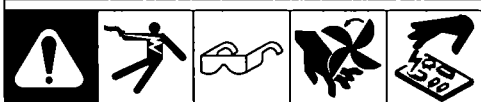
1 Torch Shield Cup

Turn Power On and loosen shield cup. If shutdown system works properly, Ready light goes off and Cup light comes on. If not, immediately turn Off power and have Factory Authorized Service Agent check safety control board PC1 operation.

If system works properly, retighten cup and reset power.

Ref. ST-801 300-A

5-6. Troubleshooting



Trouble	Remedy
No pilot arc; difficulty in establishing an arc.	Clean or replace worn consumables as necessary (see Section 5-4).
	Check for damaged torch or torch cable (see torch Owner's Manual).
	Have Factory Authorized Service Agent check power switch S1, control relay CR1, CR5 and CR6, fuses F1 and F2, rectifier SR1, safety control board PC1, power control boards PC2 and PC3, inductor L1, resistor R1, and check gas air system for leaks.
No cutting output; Power light off; Trouble lights off; Ready light off; fan motor FM does not run.	Place Power switch in On position.
	Place line disconnect device in On position (see Section 3-5).
	Check line fuse(s) and replace if needed or reset circuit breakers (see Sections 3-4 and 3-5).
	Have Factory Authorized Service Agent check power switch S1, transformer T1, and fan motor.
No cutting output; Power light on; Ready light on; Trouble lights off; fan motor FM running.	Be sure work clamp is connected.
	Clean or replace worn consumables as necessary (see Section 5-4).
	Have Factory Authorized Service Agent check safety control board PC1, power control boards PC2 and PC3, fuses F1 and F2, and rectifier SR1.
No cutting output; Power light on; Ready light on; Trouble lights off; fan motor FM running slowly.	Check input power, and check for proper input connections (see Sections 3-4 and 3-5).
No control of output.	Have Factory Authorized Service Agent check safety control board PC1 and power control boards PC2 and PC3.
No gas/air flow; Power light on; Ready light on; Trouble lights off; fan motor FM running.	Have Factory Authorized Service Agent check for proper torch connections, and check safety control board PC1. Check operation of gas valve GS1, and check gas/air system for leaks.

Trouble	Remedy
Pressure Trouble light On; Ready light off.	Check for correct gas/air pressure adjustment (see Section 4-2).
	Check for sufficient gas/air supply pressure (see Section 3-2).
	Check for dirty air filter/regulator and clean, if needed (see manufacturer's instructions).
	Check air lines for leaks.
	Have Factory Authorized Service Agent check pressure switch S3 and safety control board PC1.
Cup Trouble light On; Ready light off.	Check torch shield cup (see Section 5-5). Reset power switch.
	Have Factory Authorized Service Agent check for proper torch connections, and check safety control board PC1.
Temperature Trouble light On; Ready light off.	Main transformer or main rectifier overheating. Allow fan to run; the Trouble light goes out when the unit has cooled.
	Have Factory Authorized Service Agent check safety control board PC1.
Fan motor FM does not run; Power light and Ready light both On.	Have Factory Authorized Service Agent check fan motor connections.
	Check input power, and check for proper input connections (see Sections 3-4 and 3-5).
Trouble lights not working.	Have Factory Authorized Service Agent check safety control board PC1.

SECTION 6 – ELECTRICAL DIAGRAM

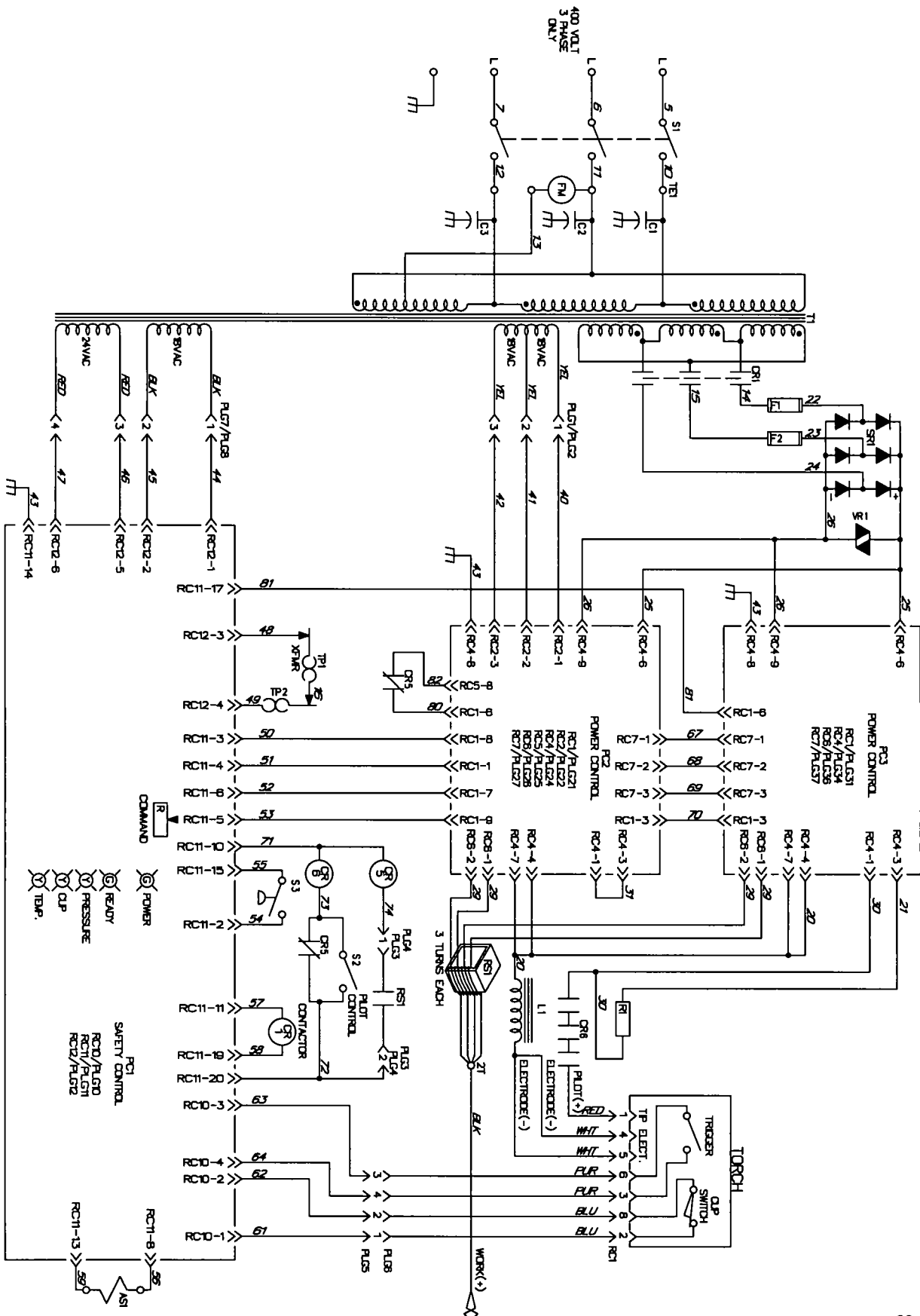
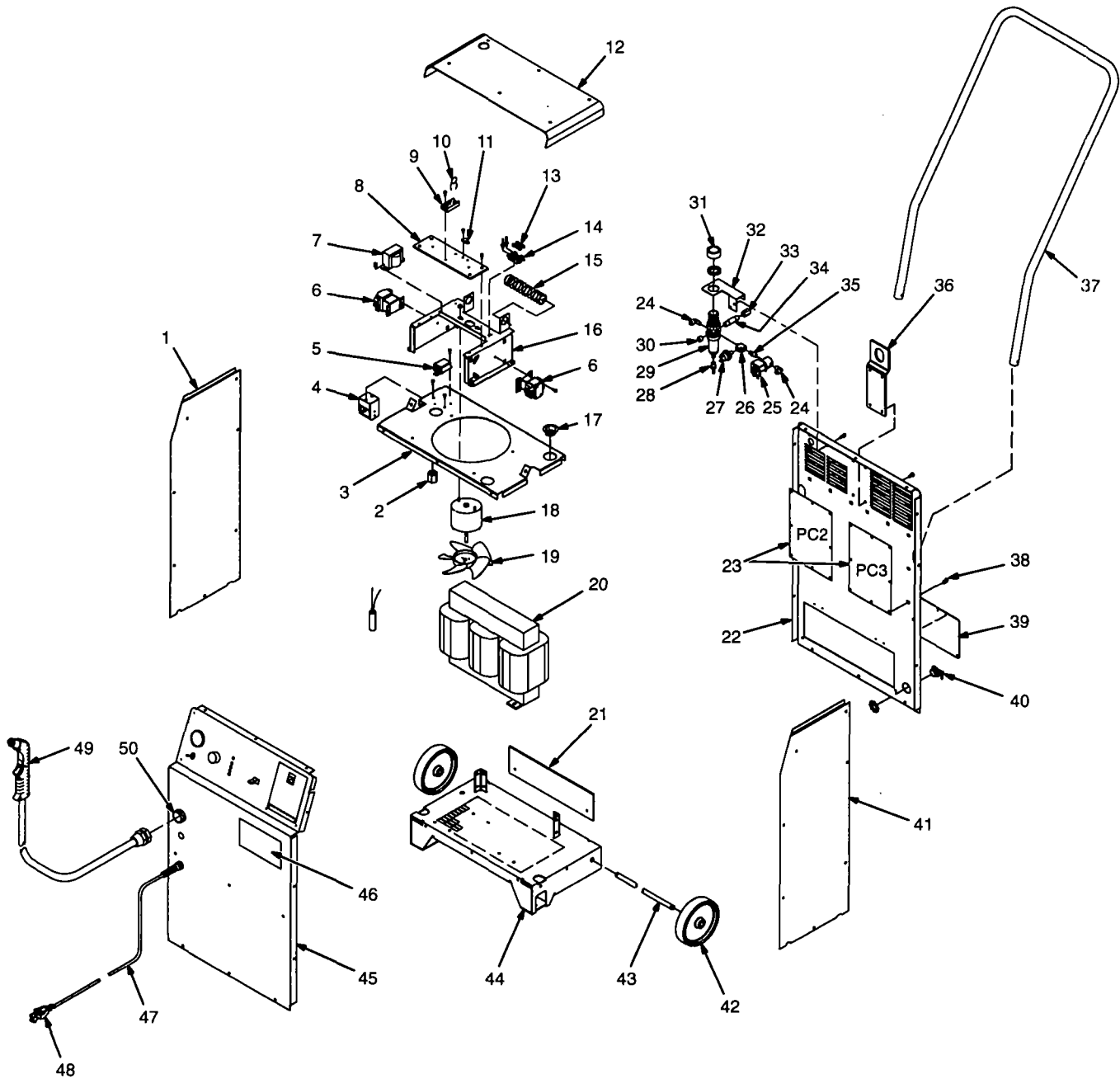


Figure 6-1. Circuit Diagram For Power Source

NOTES

SECTION 7 – PARTS LIST



ST-801 650

Figure 7-1. Main Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 7-1. Main Assembly				
1		178 158	PANEL, side LH	1
2		026 947	STAND-OFF, insul	1
3		178 162	BAFFLE, center	1
4	RS1	169 620	SWITCH, reed	1
5	CR5	006 393	RELAY, encl 24VAC DPDT 10A/120VAC	1
6	CR1,6	180 270	CONTACTOR, def prp 40A 3P 24VAC coil/cover	2
7	L1	179 543	INDUCTOR, 50A 70 micro henry	1
8		178 147	HEAT SINK, rectifier	1
9	SR1	179 542	RECTIFIER, integ 30A 800V	1
10	VR1	178 393	VARISTOR	1
11	TP2	032 810	THERMOSTAT, NC open 165°F close 135°F	1
12		178 157	COVER, top	1
13	F1,2	142 751	FUSE, mintr cer slo-blo 30A 125V	2
14		098 376	HOLDER, fuse mintr 20A 2 fuses	1
15	R1	181 843	RESISTOR, WW fxd 675W 3 ohm	1
		183 820	INSULATOR, end resistor	2
16		178 153	BRACKET, rectifier	1
17		170 647	BUSHING, snap-in nyl 1.312 ID x 1.500mtg hole	3
18	FM1	148 808	MOTOR, fan 230V 50/60Hz 1550rpm .312dia shaft	1
19		150 783	BLADE, fan 9.000 5wg 39deg .312dia bore	1
20	T1	179 999	TRANSFORMER, pwr main 400 (consisting of)	1
	TP1	166 063	THERMOSTAT, NC open 135C	1
21	TE1	181 204	TERMINAL ASSEMBLY, pri 3ph 1V	1
		038 618	LINK, jumper	6
22		178 161	PANEL, rear	1
23	PC2,3	171 668	CIRCUIT CARD ASSEMBLY, power control	2
24		176 123	FITTING, plstc Qdisc elbow 1/8NPT x 1/4 OD tubing	2
25		175 827	VALVE, 24VAC 3 way 1/8NPT 5/32 orf 100psi	1
26		602 946	FITTING, pipe brs tee B 1/8NPT	1
27		174 670	SWITCH, pressure air 40psi fixed	1
28		175 999	FITTING, hose brs barbed fem 3/16tbg x 1/8NPT	1
29		174 668	REGULATOR/FILTER, 250psig in 100psig max out 1/4P	1
30		602 938	FITTING, pipe galv plug schhd 1/4NPT	1
31		181 693	GASKET, neoprene 1.500 OD x .688 thick	1
32		178 146	BRACKET, mtg regulator	1
33		602 963	FITTING, pipe brs coupling 1/4NPT	1
34		015 733	FITTING, pipe brs nipple L 1/4NPT x 2.00	1
35		073 655	FITTING, pipe brs nipple hex 1/8NPT	1
36		179 863	LIFT EYE	1
37		178 148	HANDLE	1
38		134 201	STAND-OFF, support PC card .312/.375 w/post and lock	16
39		179 864	DOOR, access	1
40		044 426	CONNECTOR, clamp cable	1
41		178 159	PANEL, side RH	1
42		095 094	WHEEL, polyolefin 6 in dia x 1.375w .500 hub dia	2
43		178 163	AXLE, running gear .500dia x 24.5	1
		081 960	RING, rtng ext .500 shaft x .035thk C style	2
44		179 862	BASE	1
45			PANEL, front (consisting of)	1
		+178 160	PANEL, front	1
			NAMEPLATE, (order by model and serial number)	1
		179 942	CONSUMABLE STORAGE BOX	1
		181 854	DOOR, consumable box (consisting of)	1
		181 855	CATCH, door	1
	PC1	183 712	CIRCUIT CARD ASSEMBLY, safety control	1
		159 036	LENS, LED clear panel mtg	5
		159 035	CLIP, retainer lens	5
		176 478	STAND-OFF, support PC card	4
	S2	089 085	SWITCH, toggle SPST 20A 125VDC	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 7-1. Main Assembly (Continued)				
.....		174 991	..... KNOB, pointer	1
..... S1		128 756	..... SWITCH, toggle SPST 40A 600VAC scr	1
.....		181 708	..... GASKET, switch	1
..... C1,2,3		091 141	..... CAPACITOR	3
.....		178 739	..... FITTING, plstc Qdisc straight fem 1/8NPT	1
.....		179 536	..... TUBING, pneumatic .250 OD x .170 ID x 10.00	1
.....		179 537	..... TUBING, pneumatic .250 OD x .170 ID x 17.00	1
.....		178 740	..... GAUGE, pressure air 0–160psi 1/8NPT	1
.....		179 539	..... HOSE, SAE .187 ID x .410 OD x 28.00	1
.....		168 343	..... HINGE, cont polyolefin 2.00 L w/.125H	2
... 46		179 219	..... LABEL, general precautionary	1
... 47	Work	169 687	..... CABLE, work 20ft No. 6 w/strain relief and term	1
... 48	Work	171 001	..... CLAMP, work 100A	1
..... PLG22,27,37		164 900	..... CONNECTOR & SOCKETS	3
..... PLG10		164 899	..... CONNECTOR & SOCKETS	1
..... PLG5		167 640	..... CONNECTOR & SOCKETS	1
..... PLG24,34		168 071	..... CONNECTOR & SOCKETS	2
..... PLG26,36		176 121	..... CONNECTOR, rect univ 084	2
..... PLG12		153 501	..... CONNECTOR & SOCKETS	1
..... PLG21,31		158 720	..... CONNECTOR & SOCKETS	2
..... PLG11		169 240	..... CONNECTOR & SOCKETS	1
..... PLG2,8		170 888	..... CONNECTOR & SOCKETS	1
..... PLG25		131 056	..... CONNECTOR & SOCKETS	1
... 49			..... ICE-50C, (order separately)	
.....		176 824	..... ICE-50C, 25ft	1
.....		176 826	..... ICE-50C, 50ft	1
.....		176 828	..... ICE-50CM, 50ft machine mounted	1
.....		180 605	..... PENDANT CONTROL, (recommended for use w/ICE-50CM)	1
... 50		178 262	..... DISCONNECT, quick ICE-50	1

+When ordering a component originally displaying a precautionary label, the label should also be ordered.
BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

